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we are indebted to Treves for first advocating the removal of the appendix
when the patient has recovered from an acute attack.

Wood + Fitz "Medicine" 1897 p.886



THE SURGICAL TREATMENT
OF
TYPHLITIS.

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OF TYPHLITIS

BY

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PREFACE.

THIS little monograph has been reprinted, with many additions and alterations, from the *British Medical Journal*. The paper, as published in that Journal, represented the address with which I opened the discussion on the Surgical Treatment of Typhlitis, at the Meeting of the British Medical Association, held at Leeds, August, 1889. I have introduced a short account of the Anatomy of the Cæcum and Appendix as a prelude to the main subject.

THE
SURGICAL TREATMENT OF TYPHLITIS.

BY FREDERICK TREVES, F.R.C.S.,

*Surgeon to, and Lecturer on Anatomy at, the London Hospital ;
Member of the Board of Examiners at the Royal
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**Some Points in the Anatomy of the
Cæcum and Appendix.**

The cæcum.—The cæcum is that part of the large intestine which lies below the level of the ileo-cæcal valve, that is to say, below the point of entrance of the ileum. The average breadth of the adult cæcum is three inches, and the average length two-and-a-quarter inches. The shape and outline of the cæcum are liable to considerable variations. These are of anatomical interest and permit of cæca being classified under four types, which however are of little surgical importance.

The cæcum is always entirely covered by

peritoneum, and will never be found to be attached by areolar tissue to the iliac fascia.

As I have ventured to point out in my Hunterian lectures ("The Anatomy of the Intestinal Canal and Peritoneum," London, 1885), there is no fold of peritoneum which represents the "meso-cæcum" of the older anatomists.

The position of the cæcum.—The cæcum is usually found lying upon the psoas muscle, and so placed that its apex or lowest point is just projecting beyond the inner border of that muscle.

In such a case the cæcum will often be nowhere in relation with the iliacus muscle, or only its upper limits will be in contact with that structure.

In less frequent examples the cæcum may, however, be found to be in relation with the iliacus only, or the bulk of the caput coli may lie upon that muscle, while the apex rests upon the psoas.

In the great majority of instances the apex of the cæcum corresponds with a point a little to the inner side of the middle of Poupart's ligament.

In a number of cases the cæcum is entirely clear of both psoas and iliacus and hangs over the pelvic brim, or is lodged entirely within the

pelvic cavity. In eighteen instances out of one hundred bodies examined I have found the cæcum wholly in the pelvis, lying sometimes directly upon the pelvic floor, or placed in contact with the upper surface of the bladder or uterus, or wedged in with the sigmoid flexure, or lying actually in contact with the left wall of the pelvic basin.

It is not exceedingly rare to find that some part of the cæcum has just passed to the left of the median plane of the body.

The position of the cæcum in these unusual situations may serve to explain some mysterious forms of localised peritonitis and some cases of what is apparently pelvic peritonitis occurring in men.

The relation of the cæcum to the peritoneum.
—The cæcum, as already stated, is always entirely invested by serous membrane on all sides. The line of reflection of the peritoneum, from the posterior wall of the cæcum on to the posterior abdominal parietes, varies somewhat. When an ascending meso-colon exists, this reflection will coincide with the origin of such meso-colon. In any case it is continuous with the left or under layer of the mesentery. The reflection is usually transverse, and is commonly placed

between a line on a level with the summit of the iliac crest, and another on a level with the anterior superior iliac spine. It is, as a rule, limited to the surface of the psoas muscle, or to that muscle and a small portion of the adjoining part of the iliacus. In a few instances I have found the reflection to coincide with the latter muscle only. The line of the reflection may, in a smaller series of cases, be oblique. In such instances it may follow the inner border of the psoas muscle, or cross the surface of that muscle, or correspond to its outer margin.

In the great majority of bodies the reflection, in reality, takes place from the posterior surface of the ascending colon and not from the cæcum, so that not only is the cæcum entirely covered by serous membrane behind, as well as on all sides, but the same complete covering is bestowed upon the commencement of the ascending colon. The average measurement in a vertical line along the back of the colon, from the tip of the cæcum to this reflection of peritoneum, is four inches.

The mobility of the cæcum.—The mobility of the cæcum is often considerable, and depends in the main upon two conditions—either upon the length of intestine that extends between the tip of the cæcum and the reflection of the peri-

toneum above alluded to, or upon the presence of an ascending meso-colon. The former factor is of greater moment than the latter. In eleven bodies (out of one hundred examined) I have met with cæca that could be made to touch the under surface of the liver, and any part of the left side of the pelvis. In one case the tip of the cæcum could be made to touch the xiphoid cartilage, and in several instances the mobile piece of intestine could be drawn down the thigh to the level of the great trochanter.

Non-descent of the cæcum.—The cæcum may remain undescended throughout the whole period of existence. In such a case the caput coli will usually be found immediately under the liver and just to the right of the gall bladder. It will be quite horizontal, will continue the long axis of the transverse colon, and will be included between the layers of the transverse meso-colon. The appendix in such instances lies along the posterior aspect of the bowel. It will be obvious that if typhlitis or appendicitis were to arise in parts so placed a considerable difficulty in diagnosis would arise. I am not aware that any such case has been placed on record.

The appendix.—The average length of the vermiform process is four inches, the extremes

being one inch on the one hand, and six inches on the other. The width of the process is liable to very little fluctuation. Appendices, under the length of three inches, may appear as quite straight tubes. In the great majority of instances, however, it is found much twisted upon itself. Its spiral form depends mainly upon the shortness of its mesentery. When the tube is untwisted—a measure which will usually involve some division of the mesentery—it most commonly forms a fairly regular curve, with the concavity towards the cæcum. This curve will carry the appendix behind the cæcum, and it will be usually found to continue the direction of the curve formed by the anterior muscular band.

The process is not infrequently found bent sharply upon itself at its extremity, so as to form a species of hook. This is a condition which appears to favour the obliteration of the lumen of the tube at the bend and to encourage the accumulation of mucus in the part beyond.

In the adult body the appendix will usually be found to lie behind the end of the ileum and its mesentery, and to point in the direction of the spleen. In the fœtus it is commonly curled up at the posterior and inferior aspect of the cæcum.

Another position which is not infrequent in the adult is a vertical position behind the cæcum.

The appendix may occupy the pelvis and may be found in contact with the sigmoid flexure, rectum, uterus, or bladder.

The mesentery of the appendix is formed by a fold of peritoneum, which comes off from the left or under layer of the mesentery of the end of the ileum. Its origin from this layer is along a straight line, which is situated at a short distance from the intestine, and which is not quite parallel with the margin of the bowel. If the appendix be pulled away from the cæcum so that its mesentery is fully displayed, it will appear to come off at right angles from the enteric mesentery.

At one extremity this little fold runs right up to the ileo-cæcal junction, while at the other end it forms a free and concave margin. In its general outline it is triangular. In the fœtus it may extend to the tip of the appendix, but in the adult it often only reaches to the centre of the tube or to the junction of its middle with its distal third. It is too short for the process, and this disproportion between the process and its serous fold accounts for the twisted condition of the former. In the free margin of this little mesentery there runs a branch of the ileo-colic artery.

The mesentery is liable to extreme variations,

the most usual of which depend upon the shortening of the fold in all directions.

There are various peritoneal fossæ about the cæcum and especially in the vicinity of the ileo-cæcal junction, but they are devoid of immediate surgical interest.

The appendix represents the terminal part of a long, curved and conical shaped cæcum. Such a cæcum can be seen in many apes. It is evident that it is the shrunken, mis-shaped and wasted extremity of what was once a cæcum of considerable length and that it is disappearing from the mammalian series. The appendix is useless and functionless, and its anatomical elimination is aided by pathological processes. It is quite common to find in *post-mortem* subjects that the vermiform process is wanting. Traces of it are indicated, and such relics as exist are buried in a mass of inflammatory adhesions. The appendage has in such instances been obliterated by a morbid process.

The vermiform process is obsolete and out of date, and it is safe to predict that in the intestine of the man of the future there will be no such structure found hanging from the cæcum.

From a point of view of the survival of the fittest it is clear that, other things being equal,

the individual without an appendix has an advantage over the individual with one.

The process exhibits great variety in its length and disposition, and is the least constant part of the alimentary canal. It is a source of danger and a not infrequent cause of death.

The man who has lost his appendix from typhlitis can hardly expect to transmit his dearly-bought defect to his offspring, but he may regard himself as one in whom the process of evolution is manifest and derive what consolation he can from the contemplation of that fact.

Typhlitis.

GENERAL CHARACTERISTICS.—The term typhlitis is conveniently applied to a form of localised peritonitis occurring in the cæcal region. In its general features and potentialities this variety of localised peritonitis differs in no essential from other like-named conditions within the abdomen. The inflammation may spread to the general surface of the peritoneum. It may lead to suppuration, or it may not. If the peritonitis remain simple in character it may leave scarcely a trace of its existence, or it may, on the other hand, produce adhesions of almost any grade. If it result in suppuration the pus will, with few exceptions,

be encysted, and the resulting abscess may either burst through the skin or open into the abdominal cavity, or find its way into some neighbouring hollow viscus or into the connective tissue of the vicinity.

In all its chief phenomena this form of peritonitis is identical with that known as pelvic peritonitis, or with the peritoneal inflammation which may follow upon abscess of the liver, or a slowly perforating tubercular ulcer of the bowel. It differs from these and from other varieties of localised peritonitis in site, in anatomical surroundings, and possibly in the matter of causation. These latter features, and these alone, give to the trouble any distinctive peculiarities which it may possess. They serve also to modify a treatment which, in its primary motives, is the treatment simply of localised peritonitis.

It is unfortunate that the term typhlitis directs conspicuous attention to the cæcum, and still more unfortunate that the appreciation of this variety of peritonitis should have been encumbered by mere terms and obscured by classifications.

It was at one time customary to divide inflammations about the cæcum into three or four classes: (*a*) inflammation of the cæcum itself

(typhlitis); (*b*) inflammation of the peritoneum about that bowel (perityphlitis); (*c*) inflammation of the connective tissue supposed to partly surround the cæcum (paratyphlitis); and (*d*) inflammation of the appendix (appendicitis). This classification has long since been shown to be unsound.

Without entering at length into the pathology of the affection, the following points may be briefly stated :

1. There is no evidence to show that primary inflammation of the walls of the cæcum, independent of catarrh or ulceration of the mucous membrane, exists.

2. Inasmuch as both the cæcum and the appendix are entirely covered by serous membrane, a perforation in either of these organs cannot lead to suppuration of the connective tissue of the iliac fossa. Primary inflammation of this connective tissue may safely be said to be unknown.

3. Catarrh of the cæcum occurs in connection with a more general colitis, but the symptoms produced are those of colitis, and not of typhlitis. Catarrh of the cæcum, even when of an acute kind, does not appear to produce the symptoms of typhlitis.

4. Ulceration of the cæcum is common. The most usual form of ulcer is that known as the stercoral, and is due to the impaction of fæces in the part. Hard masses of fæcal matter collect in the cæcum, and partly by pressure, partly by the chemical and mechanical irritation they induce, lead to an ulcerative catarrh. The subjects of simple typhlitis very commonly give a history of long-abiding dyspepsia and constipation, and their cæca become receptacles for masses of decomposing and imperfectly-digested food. A foreign body accidentally swallowed may in like manner induce an ulcer the characters of which are purely local.

Other forms of ulceration are associated with tuberculosis, with dysentery and typhoid fever, with the impaction of foreign bodies, and possibly with syphilis. (Cancer of the bowel is not considered.) An ulcer of the cæcum, so long as it remains limited to the mucous membrane, may cause no symptoms, and will, in any case, not produce the symptoms of typhlitis. When such an ulcer has spread to the outer walls of the caput coli a peritonitis ensues, and the typical phenomena of typhlitis of some grade are usually produced. Any ulcer of the cæcum may lead to perforation. In connection with the stercoral

ulcer the perforation appears late, and follows upon the symptoms of prolonged fæcal obstruction. A large number of cases of fatal fæcal accumulation terminate by perforation or rupture of the cæcum, but in such instances the preceding symptoms have not been those of typhlitis.

5. Perforation of the cæcum as (what may be termed) a primary condition is very rare. Fitz in his elaborate monograph (dealing with 257 cases of perforative appendicitis and 209 cases of typhlitis—so called) could only find three examples, one from the impaction of a pin, another from impaction of a fish bone, and a third from some “strangulation” of the bowel. I have known perforation of the cæcum to occur as a primary condition, preceded by few abdominal symptoms, in a case of tubercular ulcer of the colon in a subject of phthisis. When a typhlitic abscess is evacuated it is not uncommon to find that the abscess communicates through a ragged aperture with the cavity of the cæcum. In nearly every instance of this there is evidence to show that the abscess had commenced outside the cæcum (in the appendix), and had made its way into the caput coli, just as it might have burst into the bladder or ileum, or have entered the connective tissue behind the ascending colon.

6. Abscesses resulting from mischief in the cæcum or appendix are primarily intraperitoneal, and are encysted forms of suppurative peritonitis. Inasmuch as the cæcum and vermiform process are normally entirely surrounded by serous membrane, any inflammation extending from them must first implicate the peritoneum. The pus resulting from the encysted suppurative peritonitis (the intraperitoneal abscess) may burst into the abdominal cavity, or make its way through the skin or into the connective tissue of the vicinity, or effect an escape through any adjacent hollow viscus such as the rectum or bladder.

7. The milder varieties of typhlitis are usually due to a peritonitis over the cæcum which has been set up by the spreading in depth of a stercoral ulcer. The severer forms, and notably those which induce suppuration, usually depend upon troubles in the appendix such as may be due to a foreign body or a fæcal concretion, to the twisting or strangulation of the process, and the like. The records of the London Hospital during the last few years show twenty-five fatal cases of "typhlitis," in every one of which the appendix was found to be involved. During the same period over thirty-five cases of typhlitis were admitted in which complete recovery

followed without suppuration, and with no other than medical treatment. Fitz, as the result of his investigations, remarks, "In most fatal cases of typhlitis the cæcum is intact, while the appendix is ulcerated and perforated." On the other hand, I have been able to show that typhlitis of quite a mild grade may follow troubles in the appendix, and may end in speedy resolution, and that severe forms of typhlitis may be due to mischief in the vermiform process without any suppuration following. In one case under my care the patient had had fourteen attacks of typhlitis; surgical exploration showed that the appendix was the cause of the trouble, but not one drop of pus had been formed. (See below).

8. With regard to the specific troubles in the appendix which cause typhlitis, the cases collected by Fitz, Bull, and others show that a fæcal concretion may be expected to exist in nearly one-half of the cases, and a foreign body in nearly one-eighth. The latter include seeds, grape stones, cherry stones, bristles, pins, shot, small gall stones and the like. The appendix in these instances is found to be perforated, or in a state of sloughing or gangrene. The process may be found perforated, and yet no foreign body be detected. It may become gangrenous from being

twisted upon itself, or may be found to be enormously distended with mucus from obliteration of its lumen, or to be the seat of acute ulceration. It may be adherent to the cæcum, to the ileum, the rectum, the bladder, the ureter, the mesentery, or to the peritoneum of the pelvis or abdominal wall. The resulting abscess may burst through the anterior abdominal parietes or make its way into the pelvis or thigh, or open into any neighbouring viscus. It has extended along the connective tissue behind the ascending colon, and has reached the liver, and even perforated the diaphragm. It has entered the hip-joint, and has laid bare the ilium. As regards the usual tendency of the abscess, an analysis of sixty-seven cases collected by Bull shows the following: In twenty-eight instances the abscess burst through the anterior abdominal parietes, in fifteen it entered the cæcum, in eight the general peritoneal cavity; in two instances each it made its way respectively into the thorax, the rectum, and the bladder.

By an examination of the fatal cases Fitz shows that no less than 68 per cent. die during the first eight days, and that two-thirds of these die between the fourth and eighth days inclusive. This analysis refers to cases of suppuration following trouble in the appendix.

Inflammation of the appendix tends to lead to the obliteration of this process. I have found the appendix reduced to a mere fibrous cord which was embedded in a mass of tough adhesions. In such an instance the process had been practically destroyed and had been rendered incapable of producing fresh trouble. In other instances an abscess has formed, a concretion or a foreign body has been discharged, and the abscess has healed, leaving the appendix obliterated and in a condition incapable of producing further harm. Or again the symptoms of typhlitis may depend upon the distension of a distorted appendix by retained mucus. The immensely dilated process may then become ruptured and a violent outburst of local peritonitis follow. If the patient survive it is possible that the appendix may never again cause trouble, the greater portion of it having been destroyed by the violent inflammation which has raged around it.

Unfortunately it is not always possible to anticipate a spontaneous cure by this method. The patient may die in the first attack or he may have repeated outbursts of inflammation and succumb to such an one many months after the trouble began. Reliance cannot be placed upon this method of cure, as the high mortality attend-

ing appendicitis only too emphatically demonstrates.

It is important, however, to bear in mind that there is in appendicitis an element which may lead to cure, an element which depends upon very uncertain factors, and which, from a therapeutic point of view, must figure rather as a chance occurrence or a feature of fortune.

GENERAL CLINICAL PHENOMENA.—*The general clinical phenomena* of typhlitis are clearly enough drawn. At the outset, however, of a consideration of the clinical features of the trouble a discrepancy appears as to the gravity to be attached to the disease considered as a whole. On the one hand, the utterances of certain surgical writers leave the impression that the disorder is of the very gravest character, that it is attended by a high mortality, and that the prospects of recovery lie mainly within the possibilities of a surgical operation. On the other hand, there are physicians who would lead us to suppose that typhlitis is an affection of no great gravity, and that it can be successfully dealt with by medical measures alone. In the discussion which followed the reading of my paper on the treatment of relapsing typhlitis before the Royal Medical and Chirurgical Society in 1887 a physi-

cian of great experience—Dr. Hare—stated that “he had met with a good many cases of typhlitis, but he ventured to say that none had gone to a point requiring surgical interference.” Both positions are tenable, or, in other words, typhlitis is met with under very varying degrees of severity.

For the purpose of discussing the treatment of the disease, typhlitis may be divided into three classes :

1. The mild form of the trouble. This, as hospital records show, is the commoner variety of typhlitis ; is a form which usually ends in resolution, and is amenable to simple medical measures. It would appear to be usually that variety which depends upon fæcal accumulation in the cæcum, or, at least, upon the lodgment of some irritating matter in that bowel. Stercoral ulcers result, lead in due course to some peritonitis in the serous membrane about the caput coli, and the phenomena of typhlitis are present.

Comparing this form with the severer variety next to be described the following points may be enunciated :—

The trouble is more common in males than in females, although the proportion is not so marked as in the severer variety. The patients are

mostly young adults. Thirty-six per cent. are under 20 ; 21 per cent. are over 40. In perforating appendicitis 50 per cent. are under 20 and only 9 per cent. over 40 years (Fitz).

The patients are usually the subjects of constipation and have passed scybala ; or they may be suffering from diarrhœa induced by the presence of scybala (colitis). They suffer very commonly from chronic dyspepsia or from intestinal indigestion. They are apt to be frequently troubled with abdominal symptoms of various kinds and the typhlitis may follow some indiscretion in diet. The pain appears suddenly, but is on the whole less severe than in the graver form. There is seldom any rigor, the fever is not so high, the vomiting not so marked, and the pain is less apt to radiate to distant parts, for example to the thigh or testis. The tenderness is perhaps less pronounced ; the tumour appears earlier—possibly from the first—it is comparatively large, is apt to be doughy, and to feel less fixed ; it cannot so readily be made out through the rectum. Bladder troubles are usually absent. The inflammatory symptoms gradually subside, and the attack passes off—so far as its acute symptoms are concerned—in from three to seven days. A careful digital examination per rectum

and careful palpation of the iliac fossa do not reveal any swelling that resembles a swollen appendix and after the attack is well over the complete clearing up of the induration is usually striking.

It is impossible to be emphatic in these distinctions, nor can it be urged that some of the severest forms of suppurative typhlitis do not occasionally commence with quite mild symptoms. The continued absence of the local signs of suppuration as time advances is a noteworthy point, however, to which considerable importance must attach.

This form of typhlitis yields readily to medical treatment, and is the form which physicians have in mind when opposing surgical interference in this disease. With this milder form of typhlitis must be included also a large number of cases in which the mischief is probably in the appendix, and in which the symptoms are not severe and end in resolution. In some of such cases it is possible that the appendix becomes practically obliterated. I have frequently found in the *post-mortem* room a shrunk appendix, buried among adhesions, in patients who have had no severe attack of abdominal trouble during life.

2. The severer form of typhlitis leads to sup-

puration, and nearly always depends upon some trouble commencing in the appendix. The sex and the age of those who are most usually the subjects of this malady have been alluded to.

The symptoms, generally speaking, are more severe and progress more rapidly. There is often an initial chill or rigor. The condition cannot usually be associated with any preceding constipation or digestive disturbance. As a matter of fact, the state of constipation does not favour the lodgment of foreign bodies in diverticula of the bowel. There is in not a few of the cases a history of cold, or possibly of injury. The pain is severe, the vomiting marked, the tenderness and other signs of peritonitis pronounced. The fever is usually high. The tumour is slower to appear; can often be made out through the rectum, and, when felt, is demonstrated to be fixed. Not infrequently the mass can be identified as the appendix and feels to the touch as an elongated hard swelling about the size of an adult thumb. The pain is apt to radiate, to spread to the testis, thigh, or perineum, and to be associated with tenesmus and disturbances of micturition. Pain on moving the right thigh is often marked. The local swelling or the area of dulness take on the phenomena attending sup-

puration, and, at a varying period from the commencement of the trouble, evidences of pus are distinctly present. The symptoms just detailed are subject of necessity to great variation.

The very first manifestations of disease may be those of perforation, and the patient may be in a dying condition in forty-eight hours, or even less. On the other hand, the symptoms may be latent or unaccountably delayed. Buck reports that a sailor was at work rolling barrels of flour till the day of his admission to the hospital. He then had a prominent fluctuating iliac tumour, extending along the outer half of Poupart's ligament. Another sailor left Portland (U.S.A.) for New York, and arrived five days later. In the meantime he purged himself, in consequence of right iliac pain. Although suffering, he kept at work during the following week. He then left for Boston, where he arrived on the thirteenth day after the beginning of the pain. Symptoms of general peritonitis were evident, and he died the next day. A gangrenous appendix was found lying in the cavity of an iliac abscess (Fitz).

It is in this form of typhlitis that a prompt and definite surgical treatment is distinctly indicated.

3. Under the last variety are included the cases of relapsing typhlitis. This usually depends

upon some trouble in the appendix, which falls short of producing suppuration, If an abscess has formed and the patient has recovered, he is not likely to have other attacks. With the evacuation of the abscess, the cause of the trouble has been probably removed ; the fæcal concretion or the foreign body has been discharged, or the offending appendix has been destroyed by gangrene.

The simple form of typhlitis (the stercoral form), dealt with in the first of these three divisions, is apt to relapse if the conditions which originally produced it are themselves reproduced. The trouble, however, retains its primary character, and the repetitions are few, and possibly limited to one occasion.

When some little time has elapsed after an attack an examination of the cæcal region reveals nothing. The patient remains well so long as he is very careful in his diet and general management of himself. Some twinge of pain in the right iliac fossa, due possibly to some adhesions, may now and then remind him of his trouble but the complete manner in which all traces of the typhilitic swelling are removed is very striking.

In the relapsing typhlitis, due to appendix troubles, the attacks return with vigour. They

may be, and usually are, quite independent of constipation, and burst out even while every care is being taken of the patient's health. They are apt to increase in severity, and to leave the patient weaker after each repetition. The pathological condition which usually underlies this form is as follows :

The trouble is due to a retention of mucus within the vermiform process. The appendix is found twisted or bent upon itself, or held down at an angle by adhesions, or its lumen has been nearly occluded by cicatrisation after ulcer. The end of the process is found to be enormously distended with mucus, and often to be singularly hard. In one case in which I exposed such an appendix by operation, I found its extremity so large, so hard, and so rounded that it appeared as if it contained a concretion. The tube was bent upon itself, and, on setting it free, the mucus escaped and the resemblance to a concretion vanished.

There is no stone nor foreign body in these cases. The distended appendix sets up a certain amount of peritonitis, in time it relieves itself, and the patient enters a quiescent period, which may or may not precede another attack. In other and less frequent examples a foreign body

has been found which had induced two or possibly more attacks before it caused suppuration.

In one case already alluded to, the patient, a gentleman aged nineteen, under the care of Dr. Phillips, of Tickhill, had fourteen attacks of typhlitis between November, 1887, and March, 1889. The appendix, when exposed during a quiescent period, was found to be bent upon itself and distorted, and held down by a complex mass of tough adhesions. The cæcum was sound, and no evidence of suppuration existed.

THE TREATMENT OF TYPHLITIS.—The attacks of relapsing typhlitis, due to trouble in the appendix, may lessen in severity, and the disease tend to undergo spontaneous cure in the manner already described (page 23).

When the attack has entirely subsided it is frequently possible to make out the enlarged appendix, or the surgeon on careful examination can satisfy himself that the iliac fossa is not clear, but that it is still occupied by some induration.

In some of these cases I have been able to make out an enlarged vermiform process when many weeks have elapsed after an attack, and when the patient considers himself to be well. It is the persistence of local signs in the cæcal

region that forms so important a factor in deciding as to the probability of a recurrent attack. In all cases of typhlitis a careful examination, per rectum, is most important. In the female this may be supplemented by an examination per vaginam. By such examination the cæcal region may often be reached and an enlarged vermiform process detected. In children and young and very thin subjects a digital examination, per rectum, often affords most valuable information. In a child the iliac fossa can be well explored through the rectum.

It may be considered that the clinical and pathological position of typhlitis has been reviewed at a length not justified by the title of this paper; but it may also be evident that no sure line of treatment can be laid down independent of such a view.

1. Cases that may be considered to belong to the first described variety of typhlitis, *the mildest form*, do well enough under the recognised medical treatment. The patient is kept absolutely at rest, opium is cautiously administered, the least possible amount of fluid food is given, leeches are applied to the skin over the right iliac region, or some rubefacient fomentation is made to cover the abdomen. At an early period the

colon is evacuated by enemata, and for a considerable time the diet is restricted to the simplest and most easily digested elements. This form of typhlitis constitutes the commonest variety of the disease, and in dealing with the surgical treatment of this trouble the fact must never be lost sight of that the majority of cases of typhlitis get well without surgical interference of any kind.

2. In the treatment of that variety of typhlitis in which *suppuration* is expected to occur or to have occurred, surgical measures stand pre-eminent, and in their application a careful judgment must be exercised. It is to be assumed that in every instance rest will be insisted upon, opium given, the colon cleared by an enema, and the diet reduced to starvation limits. Opium should be given in the smallest efficient doses. If recklessly administered it is apt to mask the symptoms to an undesirable degree.

It may be anticipated that an incision will have to be made to meet the simple surgical principle, *ubi pus, ibi evacua*, and in connection with this incision three points have to be considered: *a*, the time at which the incision should be made; *b*, the preliminary use of the exploring needle; and *c*, the site of the incision.

a. The time at which the incision should be made.—In connection with the first point, it may be said that the use of the knife will very rarely be called for before the fifth day. Indeed, I would venture to think that surgical interference before the fifth day should not be undertaken except in the presence of very emphatic symptoms. The great majority of the operations for typhlitis are performed after the first week.

The treatment of this disease by rational and precise surgical methods is a matter of recent years. The older method of practically leaving the malady to itself, and of not opening the abscess until it was about to burst through the skin, may excuse the excessive enthusiasm of some modern surgeons who have gone to the other extreme and advise the use of the knife without compromise and without delay. One writer on on this subject¹ compares the delay in operating in typhlitis to a like delay in dealing with strangulated hernia. That the author does not recognise the incongruity of his comparison is shown by the following heroic advice: "After persevering for forty-eight hours with this treatment" (an original treatment by means of opium, saline pur-

¹ *Jour. Amer. Med. Assoc.*, June, 1888, p. 713.

gatives, and massage under ether), "if relief is not obtained, I would at once resort to laparotomy."

Many surgeons of eminence, however, and notably among them Dr. W. T. Bull, of New York, whose admirable work in abdominal surgery cannot be too liberally recognised, are in favour of early interference. Dr. Bull's earliest operation was performed thirty hours after the first symptom. It is urged in favour of early incision that a large number of recorded cases afford examples of an operation performed too late, or of a fatal issue which could have been averted by operation. Such cases exist, without doubt. They afford an argument in support of earlier interference, but do not necessarily imply that the opening of the abdomen within the first forty-eight or seventy-two hours should be the routine treatment of a case of typhlitis. The large number of cases which undergo spontaneous cure must not be lost sight of, nor can the opening of the abdomen through the muscular parietes over the cæcum be regarded as a trifling procedure. It is urged also that certain cases have ended fatally within the first thirty-six hours by perforation into the general peritoneal cavity. Such cases are, however, comparatively rare ; they can-

not be anticipated. In not a few of them the very first symptoms were those of perforative peritonitis. When such a case is met with the abdomen should, of course, be at once opened, the perforation dealt with, and the serous cavity well washed out, as is the practice in dealing with other forms of perforative peritonitis. A case of death from perforation within thirty-six hours of the appearance of the symptoms of typhlitis does not afford a legitimate argument for the routine performance of an operation within that period in even the majority of the cases. Some of the milder forms of typhlitis—those which end early in resolution—may commence with quite acute symptoms, so that the severity of the symptoms is not alone a test of the need for early operation, although it is true that, in general terms, the more acute the manifestations the greater is the need for prompt surgical measures.

Then, again, it is asserted that the abscess, if left, will burst into the peritoneal cavity and cause death, and that such a termination has been recorded when the abscess contained but an ounce or so of pus. This assertion, also, does not afford an unqualified argument in favour of the early use of the knife. As a rule, the abscess makes its way through the abdominal parietes, and does

not burst into the general serous cavity. Dr. Bull himself has shown that in sixty-seven cases of abscess the pus escaped in twenty-eight instances through the belly wall, and that in only eight examples did it burst into the peritoneal cavity. Whilst it is true that small collections of pus have followed the latter course, it is also true that abscesses containing pints of matter have been successfully opened through the integuments some weeks after the commencement of the symptoms of typhlitis.

In this connection it must also be remarked that a very small collection of pus is not easy to discover, and that in not a few recorded cases the early incision has not revealed the collection. It is true that the sooner retained pus can be let out the better, but that aphorism does not guarantee the harmlessness of speculative incisions for matter, especially when the pus is within the abdomen, and in a region the anatomical features of which are liable to great variation. Moreover, it is most desirable that the matter should be well localised, and that the resulting adhesions should have connected the inflamed district directly with the parietes. The later the operation is delayed the more easily and directly can the pus be reached. If a very early incision became the rule it would

frequently happen that the matter could not be reached without first opening the general peritoneal cavity, and could not escape without first finding its way into that space.

Deeply-seated pus is slow to make its presence evident, and in the majority of cases the evidence will not be unequivocal before the fifth day. Should its presence be made clear before that period it is obvious that surgical interference should not be delayed; and it must also be allowed that urgency of symptoms may justify an exploratory incision before the arbitrarily fixed time is reached. With some reserve Dr. Bull's dictum may be accepted: "The more rapid the development of the symptoms the earlier should the surgeon interfere."

b. The use of the needle. — The exploring needle has been extensively employed by American surgeons, but, in spite of their advocacy, I think that its use is to be strongly condemned. This needle is thrust into the iliac region of the abdomen to the depth often of three or four inches, is passed in different directions, and is sometimes introduced three or four times at one sitting. Its object is to discover pus. In the first place it may be suggested that deep-seated pus, in sufficient quantity to demand surgical

interference, may possibly be diagnosed by other means, and that if an exploration must be made it would be safer to trust to a cautious incision than to a series of plunges made in the dark.

In the next place the use of the needle can hardly be urged to be free from risk. In the course of its employment it must be thrust now and then into the cæcum, and if that part of the bowel be in a condition of ulceration it is possible that the needle may induce a suppuration that previously did not exist. It has been shown that the use of the hollow needle in extreme tympanites is not unattended with risk, and it is not to be expected that the risk will be less when it is thrust into the inflamed and softened coat of an important part of the bowel.

Typhlitis is often due to extreme distension of the appendix with mucus. An appendix so involved may reach the size of a small walnut. The typhlitis indicated may end in complete resolution. A needle introduced during the acute period in such a case may very easily tap the distended process, allow a quantity of foetid mucus to escape, and so bring about a suppuration which was by no means inevitable.

It would be unfair to draw conspicuous attention to some cases in which repeated puncturings

gave no evidence of pus but in which an abscess appeared some days later. Even when an abscess does exist it must be remembered that its walls are often formed by the cæcum and some coils of ileum matted together, and into such an abscess (when small) a needle can scarcely be introduced without risk. In one reported case,¹ I observe that the pus evacuated, after the use of the needle, was bloody, a very unusual condition in typhlitis uncomplicated by the use of this instrument.

In the hands of a skilful surgeon—such as Dr. Bull—the method of exploration may be free from the objections urged, but if the practice be extensively adopted it may be possible to learn what ills may follow upon an introduction of a needle into the iliac vessels, the ureter, or the iliac connective tissue after it has passed through an area of unhealthy inflammation.

The needle, moreover, does not appear to always fulfil the arguments for its existence. In one case of Dr. Bull's the needle punctures revealed nothing, but an incision made immediately afterwards evacuated no less than four ounces of pus. In other instances such large quantities of

¹ *Trans. Amer. Surg. Assoc.*, 1888.

matter have been let out shortly after the presence of pus had been made evident by the needle as to raise the question of the possibility of the pus having been detected by other and simpler means.

c. The site of the incision.—The best situation for the incision cannot be settled in an arbitrary manner. It should be placed over that part of the inflamed area which appears to cover the seat of suppuration. This can be usually fairly well made out during an examination under ether, provided that such examination include a digital exploration through the rectum.

It is desirable that the pus should be reached by the shortest route, and allowed to escape in the most direct manner. The most convenient incision is one made obliquely from above downwards and inwards just external to the deep epigastric artery, ending a little above and to the outer side of the middle of Poupart's ligament, and following the general inclination of the wound made for securing the iliac vessels.

An incision made in the right semilunar line will be found, in the great majority of cases, to be inconvenient and to be ill-judged, in so far as it will not permit of a direct evacuation of the pus.

A median incision is bad. The pus is localised by adhesions, and so shut off from the general peritoneal cavity. An incision in the linea alba would, except in a very few instances, fall to the inner side of the collection; the general peritoneal cavity would be opened up, and through that cavity the pus would have to be evacuated. The best placed incision is that which leads into the peritoneal enclosure without opening the general peritoneal cavity.

I have already drawn attention to the variations in the position of the cæcum and appendix. The situation of the abscess will obviously be influenced by such variations, but any gross deviation can usually be detected by a rectal examination.

The treatment of the abscess.—Other points in connection with the opening of the abscess remain to be considered. The incision should be free. A careful examination should be made for fæcal concretions and foreign bodies, and a search should be made for the appendix, and its condition, if possible, be determined. These investigations should be conducted with the greatest care, the frail character of the abscess wall should be borne in mind, and regard be paid to the fact that it will be made up of fresh

adhesions, and often of loosely attached coils of bowel. The careless introduction of the finger may break down important adhesions, and may cause a perforation into the general peritoneal cavity, or, failing this, may bare a portion of the exposed cæcum of its serous covering. The less that is done after the abscess has been opened the better.

The walls of the abscess cavity should never be scraped, as some advise. The cavity should be well washed out by means of a gentle stream of a weak and warm antiseptic solution directed through an irrigator. A large-sized drainage-tube, or a long strip of iodoform or carbolic gauze, should be introduced. If a perforated, diseased, or gangrenous appendix be discovered, a ligature of catgut or silkworm gut should be passed round the proximal part of the process where its tissues are healthy, and be tightly secured. The appendix beyond should then be divided and removed.

It is useless under such circumstances to attempt a more elaborate method for removal. The condition of the organ and of the surrounding tissues forbids a more precise surgical procedure. If the appendix be entirely gangrenous, or be perforated close to its point of origin from

the cæcum, it had better be left untouched, and in such cases I think no attempt to apply a ligature should be made. When the process is very adherent it is undesirable to make any determined attempt to remove it by dissection, or even by gentle tearing. It will probably do best if it be left quite alone. The anatomical details of the abscess cavity, moreover, are not always clear. In one case, in which I found an inch or so of a dilated ureter exposed in the walls of the abscess, it was not difficult to understand that the urinary tube might be mistaken for the vermiform process, and dealt with under that impression. The opening of the abscess is the main thing; dealing with the appendix is a secondary matter. If the appendix be at once discovered, and can be dealt with readily and simply, it is well, but persistent attempts to remove the process at all costs are to be strongly condemned.

The pus from these abscesses is occasionally healthy, but it is more usually fœtid. If actual fæcal matter is present, it will indicate a direct opening into the cæcum. When a perforation of the cæcum is discovered in the depths of a typhlitic abscess, I believe it will be wiser to make no immediate attempt to close it by operation. The margins of the opening will be thinned and prob-

ably in a sloughing condition, and the serous covering of the gut will have been destroyed. No condition could be less favourable for a plastic operation—for the careful closure of the opening by sutures. The condition will probably be made worse by a more elaborate procedure involving a resection of the cæcal wall forming the margin of the perforation. These fæcal fistulæ, if studiously left alone, more often close spontaneously than remain patent, and especially is this the case if every possible care be taken to keep the abscess cavity perfectly drained and frequently irrigated.

Cæcal fistulæ are very difficult to deal with by operation, no matter at what stage the attempt at closure is undertaken. On the other hand, their tendency to close spontaneously under careful treatment, both as regards local measures and the care of the patient's diet and bowels, is very noteworthy.

3. *The Treatment of Relapsing Typhlitis.*—The treatment of cases of relapsing typhlitis by removing the appendix during the period of quiescence offers, probably, more admirable results than are to be obtained in the treatment of any other form of the disease. I first advised this

operation in 1887, and have elsewhere very fully dealt with the circumstances and details of the procedure.¹ In these cases the patients had had three or more severe attacks of typhlitis. The relapses had occurred in spite of every possible care. The pathological condition discovered was such as has been already described. One patient had passed into the condition of a chronic invalid, and had been confined to bed for some months; others were anticipating with dread the repetition of the attack. In one case notably the patient had had three attacks; they had been of increasing severity, and the prospect of his surviving a fourth attack had become a legitimate question. In this instance an enormously-distended appendix was discovered, with a deep ulcer in its wall, and the train laid for an outburst of perforative peritonitis.²

In deciding upon this operation it must be borne in mind that the measure is only justifiable in properly selected cases. From published accounts of the operation—especially in America—and from what I have heard from private sources, it is abundantly evident that excision of the appendix has been somewhat recklessly and indis-

¹ *Med.-Chir. Trans.*, vol. lxxi. p. 165; *Lancet*, Feb. 9th, 1889.

² *Lancet*, *loc. cit.*

criminally carried out since I introduced this measure of treatment in 1887.

From the observations of some surgeons it would appear that they regard the removal of the vermiform process as the correct treatment for nearly every case of typhlitis. Such a position is entirely unjustifiable, and against such unwarrantable operations a strong protest must be raised.

There are a series of cases of relapsing typhlitis which do not depend upon appendicular trouble, and which would not be relieved by the resection of the process.

The surgeon must endeavour to convince himself that the appendix is at fault, and that its condition is such as to render another attack probable.

It has already been pointed out that a tendency to spontaneous cure is active in these cases, and while this should not cause the surgeon to hold his hand against the weight of evidence, it must always have effect in influencing his decision.

It may be said that the current attack of appendicitis is the last attack, and that any operation—if carried out at a subsequent period of quiet—is uncalled for. The attack may be the

last in more senses than one. It may be the last, and the man may live, or it may be the last, and the man may die.

The comparatively high mortality which attends appendicitis when its course is uninfluenced by surgical treatment can never be overlooked.

This operation, so far as my experience at present goes, affords absolute and certain relief. It promises a cure. Up to the present time I am able to say that I have had no death from the operation.

I would emphasise the importance of operating during the interval between two possible attacks, of waiting until all inflammatory symptoms have subsided, and until the local conditions are as favourable as possible.

These operations are delicate, are often complex, and are frequently difficult.

Dr. Dennis, of New York, is opposed to the operation of excision during the quiescent period, on the ground that the patient may not have a second attack.

If the surgeon is assured that the outbreak will not recur, then any interference would be most distinctly unjustifiable.

Dr. Dennis, as a compromise, proposes that the surgeon should wait for another development,

and should proceed to excise the process upon the second or third day of the actual attack.

If there be one surgical axiom which appears to be firmly substantiated, it is that which opposes the carrying out of any but the most urgent operation in inflamed tissues. Sir James Paget, in his admirable Lectures, has made this point very manifest. To actually wait until acute inflammation has set in before performing an excision which demands some of the niceties of plastic surgery is to select for the operation the worst possible occasion. All who have been impressed with the terrible consequences which may follow upon detailed operations carried out in a centre of acute inflammation will shrink in dismay from Dr. Dennis' advice.

In attempting to indicate the particular kind of case suited for this operation I cannot do better than describe a typical example.

T. B., aged forty-four, a carpenter, was admitted into the London Hospital under my care on May 2nd, 1890. The patient's illness dated from April, 1889. Up to this time he had had excellent health. He was a strong vigorous man who was never troubled with dyspepsia, and whose bowels acted regularly without artificial aid. He had never had syphilis, and his

personal and family history exhibited nothing noteworthy.

In April, 1889, he was attacked with abdominal pain, for which he could assign no cause. The pain began somewhat gradually, and he soon presented the characteristic symptoms of typhlitis—distension of the abdomen, severe vomiting, constipation, pain and swelling in the right iliac fossa. The attack passed off in due course. Since April, 1889, he has had recurrent attacks at intervals of five to six weeks. The acute stage of each attack lasted from five to seven days. After the urgent symptoms had subsided he entered into a slow period of convalescence, and before he could be said to have entirely recovered another attack came on. The man had done no work for nearly thirteen months; the most precise precautions had not enabled him to ward off an attack; the outbreaks were apparently increasing in severity, and he had become a chronic invalid. The patient had naturally a terror of another attack, and had come to the belief that he could not survive many more of these visitations. When I examined him I discovered a much enlarged appendix in the iliac fossa, not far from Poupart's ligament, and to the outer side of the centre of that structure.

On May 4th I excised the appendix, which I found twisted upon itself, greatly deformed and distended, so as to form a large globular mass. The operation presented no difficulty. The man's temperature after the operation never rose above 99. He recovered, without a bad symptom, and has (Oct., 1890) never been troubled with his iliac fossa since.

In such a case I am unable to see what prospect of relief can be held out to a patient unless the appendix—the cause of the trouble—be removed; and if it be decided to remove it, the next step is to select the very best time and occasion for the operation.

The points I have already suggested in connection with the *operation* itself are the following:—

1. Before the operation the position of the diseased appendix should be made out, if possible. Its position might have been indicated during one of the attacks.

2. The operation should not be performed until all inflammatory and other symptoms have quite subsided.

3. The incision should be made obliquely from above downwards and inwards over the cæcal region, its lower extremity ending just external to

the epigastric artery. The incision should not be made directly over the appendix or over the dullest region. If it be so placed a number of adhesions will probably be encountered, and the demonstration of the peritoneal cavity might be difficult. The cæcum or the appendix might be actually adherent to the anterior abdominal wall. The incising of the peritoneum should, therefore, be conducted with the very greatest care. It is well that the parietal cut should open the abdomen at a point just beyond the diseased area, and where no adhesions exist.

4. When the appendix and cæcum are exposed, the area of the operation should be cut off from the general abdominal cavity by sponges. If this plugging with sponges be well carried out, no blood should enter the peritoneal space.

5. All adhesions should be divided by cutting; none should be "broken down." The latter measure is apt to tear the bowel, or, at least, to bare it of peritoneum.

6. The appendix should be lightly clamped close to the cæcum, and should be divided about half-an-inch from that intestine; it should not be secured by a simple ligature. The mucous membrane should be united by many fine sutures, or by a continuous suture; then the divided outer

walls of the process should be brought together by a second row of sutures. When the wall of the little tube is greatly thickened by inflammatory exudation, it is practically impossible to bring the serous coats together. To still further secure the orifice, the stump of the appendix might be lightly attached to any adjacent surface of peritoneum.

7. The abdominal wound should be closed ; no drain is required.

During the progress of the operation, any adhesions likely to give rise to trouble might be dealt with ; this more especially applies to adherent omentum, or to adhesions binding down coils of small intestine. If the appendix be closely adherent to the ureter, or to a coil of the ileum, or be found deeply attached in the pelvis, its removal may be attended with very considerable difficulties. The management of such a case must be left to the judgment of the individual surgeon.

Before commencing the operation the surgeon must be prepared for such difficulties. Some cases are remarkably simple, and the removal of the diseased process can be effected in a few minutes. In other instances the surgeon's movements are seriously hampered by adhesions.

Parts are densely matted together in such a way that their recognition is very difficult. The confusion may be almost inextricable, and the risk of wounding the bowel or the ureter, or important vessels, is considerable.



